

COMPOSITIONS AND THEIR USE IN FOOD PRESERVATION

Technical field of invention

The present invention relates to compositions comprising at least two extracts selected from oak extract, grape seed extract and green tea extract. Said compositions are useful in food preservation.

State of the art

A form of deterioration of foods in general, and in particular of meat-based products, is due to lipid peroxidation, namely the oxidative degradation of lipids, also known as rancidification.

Said oxidative degradation processes are caused by the interaction between free reactive oxidative molecules (such as free radicals) and the lipids present in food. This triggers a chain reaction that leads to the oxidation process in fats. The use of antioxidants in products liable to lipid peroxidation allows this process to be interrupted or controlled. By stabilising free radicals, antioxidants stop or reduce the lipid peroxidation process.

The maintenance of an adequate cold chain during food preparation and preservation, together with vacuum packaging, reduces the speed of said processes, but does not stop them.

The addition of antioxidants to a substrate liable to oxidation is an effective method of interrupting or considerably reducing the lipid peroxidation process.

Synthetic and natural antioxidants are known.

Examples of synthetic antioxidants which can be added to meat-based products include butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), tert-butylhydroquinone (TBHQ) and propyl gallate (PG). However, strict limits on the use of said antioxidants have been set by the legislation governing food additives; moreover, their safety is under discussion, as it appears that they may be carcinogenic, for example.

Natural antioxidants include some plant extracts, such as extracts of rosemary, sage and oregano, and polyphenols of various plant species. Although their origin is natural, this does not guarantee their safety.

Numerous studies have been conducted worldwide to find natural
5 antioxidants which, if added to foods, especially meat, interrupt or reduce the lipid peroxidation processes, so that the foods last longer.

The use of natural antioxidants to improve food preservation and quality therefore remains desirable, and there is consequently a need to identify cheap sources of polyphenols which can be applied on an industrial scale.

10 In view of the factors set out above, there is still a need to identify alternative compositions of natural origin that effectively control the lipid peroxidation process for the preservation of foods liable to lipid peroxidation, especially meat-based products, sweet and savoury baked goods, and preserves.

Summary of the invention

15 The present invention relates to preservative compositions comprising at least two extracts selected from oak extract, grape seed extract and green tea extract.

The invention also relates to the use of said compositions in food preservation.

Description of the invention

20 The present invention relates to preservative compositions comprising at least two extracts selected from oak extract, grape seed extract and green tea extract, provided that when the at least two extracts are grape seed extract and green tea extract the compositions also comprise oak extract.

In particular, the compositions can include oak extract combined with grape
25 seed extract or green tea extract, or grape seed extract combined with green tea extract and oak extract.

It has now surprisingly been found that compositions comprising two extracts selected from oak extract, grape seed extract and green tea extract are useful in the

preservation of foods liable to lipid peroxidation, especially meat-based products. In particular, said combinations of extracts produce a synergistic effect in the control of the lipid peroxidation process in foodstuffs.

Oak (O) extract is preferably an extract characterised by a total polyphenol content equal to or greater than 65% w/w, and is more preferably a dried extract. According to a preferred aspect, the oak extract can be obtained from bark.

The oak extract can be present (in the food to be preserved) in quantities ranging from 1 to 1000 mg/kg, preferably 10 to 200 mg/kg, and even more preferably amounts to 50 mg/kg.

Grape seed (GS) extract is preferably an extract characterised by a content equal to or greater than 95% w/w in total proanthocyanidins (calculated by the Folin method and expressed as catechins) and a monomer content (resulting from the sum of the catechin and epicatechin expressed as catechin) ranging between 5 and 15% w/w evaluated by the HPLC method, and is more preferably a dried extract.

The grape seed extract can be present (in the food to be preserved) in quantities ranging from 1 to 1000 mg/kg, preferably from 10 to 200 mg/kg, and even more preferably amounts to 50 mg/kg.

Green tea (GT) extract is preferably an extract characterised by a polyphenol content (calculated by the Folin method and expressed as catechins) equal to or greater than 45% w/w, and a catechin content (expressed as epicatechin-3-O-gallate), evaluated by the HPLC method, equal to or greater than 15% w/w, and is more preferably a dried extract.

According to a preferred aspect, the green tea extract can be obtained from the leaves.

The green tea extract can be present (in the food to be preserved) in quantities ranging from 1 to 1000 mg/kg, preferably from 10 to 200 mg/kg, and even more preferably amounts to 50 mg/kg.

All the extracts are commercially available or can be easily prepared by the

skilled person using known techniques.

The present invention relates to compositions comprising at least two extracts selected from oak extract, grape seed extract and green tea extract, optionally mixed with at least one acceptable excipient and/or carrier.

5 A further object of the present invention is the use of preservative compositions comprising at least two extracts selected from oak extract, grape seed extract and green tea extract for the preservation of foods liable to lipid peroxidation, especially meat-based foods.

Preferably, the invention relates to the use of preservative compositions
10 comprising oak extract combined with grape seed extract, or oak extract combined with green tea extract, or grape seed extract combined with green tea extract.

More preferably, the invention relates to the use of preservative compositions comprising oak extract combined with grape seed extract and/or green tea extract.

According to a further aspect, the meat-based foods to be preserved can be
15 mincemeat, cured meats, hams and tinned meats; preferably ham, salami, sausages and tinned meat.

The combination of two extracts selected from oak extract, grape seed extract and green tea extract has proved to enhance the effects on the control of the lipid peroxidation process to which foods are liable, thus improving the preservation of
20 said foods.

The compositions according to the invention can also be used for the preservation of sweet and savoury baked goods and preserves.

The following examples further illustrate the invention.

Examples

25 The experimental examples relate to the evaluation of efficacy in food preservation.

Evaluation method

To evaluate efficacy in the preservation of foods liable to lipid peroxidation,

the thiobarbituric acid value is determined in food matrices.

The thiobarbituric acid value is a test frequently used to evaluate the secondary lipid oxidation level in a food.

Said method is based on the spectrophotometric measurement of a red chromophore, formed as a result of a TBA (*thiobarbituric acid*) reaction with the by-products of oxidation of the unsaturated fatty acids formed during the food breakdown process.

Malondialdehyde (MDA) is used as reference and calibration standard, and the test result is expressed in milligrams of MDA per Kg of product (food).

A 10 g portion of sample is dissolved in 30 ml of trichloroacetic acid (7.5%), homogenised with Ultraturrax and then filtered. Part of the filtrate (5 ml) is mixed with 5 ml of a 0.02M solution of TBA, and incubated at 100°C for 40 min. The read-out of the absorbance at 532 nm against the blank is shown below; the reference calibration curve is prepared with solutions at different TEP (*tetraethoxypropane*) dilutions.

Example 1 - Efficacy evaluation (comparative example)

The effect of oak extract on meat preservation was evaluated on the basis of MDA formation as lipid peroxidation index of fats. The results are set out below.

Treatment mg/kg	Time	mgMDA/kg	Inhibition
None	T2	1.98±0.2	-
	T8	6.43±0.2	-
Oak extract 50	T2	1.76±0.1	11.1
	T8	4.17±0.2	35.14
Oak extract 100	T2	1.63±0.1	17.67
	T8	3.85±0.2	40.12
Oak extract 200	T2	1.49±0.1	24.74
	T8	3.09±0.2	51.9

Example 2 - Efficacy evaluation (comparative example)

The effect of grape seed extract on meat preservation was evaluated on the basis of MDA formation as lipid peroxidation index of fats. The results are set out below.

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Treatment mg/kg	Time	mgMDA/kg	Inhibition
None	T2	2.10±0.1	-
	T8	6.75±0.2	-
Grape seed extract 50	T2	1.83±0.1	12.85
	T8	4.63±0.2	31.04
Grape seed extract 100	T2	1.78±0.1	15.23
	T8	4.23±0.1	37.33
Grape seed extract 200	T2	1.54±0.2	26.66
	T8	3.01±0.2	55.40

Example 3 - Efficacy evaluation (comparative example)

The effect of green tea extract on meat preservation was evaluated on the basis of MDA formation as lipid peroxidation index of fats. The results are set out below.

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Treatment mg/kg	Time	mgMDA/kg	Inhibition
None	T2	2.21±0.2	-
	T8	6.83±0.3	-
Green tea extract 50	T2	1.92±0.1	13.51
	T8	4.56±0.2	33.23
Green tea extract 100	T2	1.81±0.1	18.09
	T8	3.25±0.2	45.09
Green tea extract 200	T2	1.52±0.1	31.22
	T8	3.01±0.2	55.28

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Example 4 - Efficacy evaluation

The effect of the combination of oak extract and grape seed extract (O/GS) according to the invention on meat preservation was evaluated on the basis of MDA formation as lipid peroxidation index of fats. The results are set out below.

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Treatment mg/kg	Time	mgMDA/kg	Inhibition
NONE	T2	2.45±0.1	-
	T8	5.96±0.2	-
O/GS extract 62.5 (50+1.25)	T2	1.65±0.2	32.65
	T8	1.68±0.1	71.81
O/GS extract 100 (50+50)	T2	1.04±0.2	57.55
	T8	0.66±0.1	88.90
O/GS extract 250 (50+200)	T2	0.71±0.1	71.02
	T8	0.12±0.1	97.98

Example 5 - Efficacy evaluation

The effect of the combination according to the invention of oak extract and green tea extract (O/GT) on meat preservation was evaluated on the basis of MDA formation as lipid peroxidation index of fats. The results are set out below.

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Treatment mg/kg	Time	mgMDA/kg	Inhibition
None	T2	2.21±0.2	-
	T8	7.13±0.3	-
O/GT extract 62.5 (50+1.25)	T2	1.53±0.1	30.77
	T8	2.14±0.1	69.98
O/GT extract 100 (50+50)	T2	1.03±0.1	53.40
	T8	1.07±0.2	84.99
O/GT extract 250 (50+200)	T2	0.61±0.1	72.52
	T8	0.20±0.1	97.19

Example 6 - Efficacy evaluation

The effect of the combination of green tea (GT) extract and grape seed (GS) extract according to the invention on meat preservation was evaluated on the basis of MDA formation as lipid peroxidation index of fats. The results are set out below.

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Treatment mg/kg	Time	mgMDA/kg	Inhibition
None	T2	2.16±0.1	-
	T8	6.73±0.2	-
GT/GS extract 62.5 (50+1.25)	T2	1.44±0.1	36.28
	T8	1.80±0.2	73.64
GT/GS extract 100 (50+50)	T2	1.08±0.2	50.00
	T8	1.14±0.1	83.06
GT/GS extract 250 (50+200)	T2	0.54±0.1	76.10
	T8	0.32±0.1	95.24

As clearly demonstrated by examples 4-6 above reported, the effect obtainable by administering the compositions according to the invention is greater than the sum of the individual effects obtainable by administering the oak, grape seed and green tea extracts separately. In other words, the interaction between the individual active ingredients produces an evident synergistic effect.

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CLAIMS

1. Preservative compositions comprising at least two extracts selected from:
 - oak extract obtained from bark,
 - grape seed extract,
 - 5 - green tea extract,

provided that when the at least two extracts are grape seed extract and green tea extract the compositions also comprise oak extract.
2. Preservative compositions as claimed in claim 1, comprising oak extract
10 combined with grape seed extract or green tea extract, or grape seed extract combined with green tea extract and oak extract.
3. Preservative compositions as claimed in claim 1 or 2, wherein the oak extract is characterised by a total polyphenol content equal to or greater than 65% w/w.
- 15 4. Preservative compositions as claimed in claims 1-3, wherein the grape seed extract is characterised by a total proanthocyanidin content, calculated by the Folin method and expressed as catechins, equal to or greater than 95% w/w, and a monomer content, resulting from the sum of catechin and epicatechin expressed as catechin,
20 ranging between 5 and 15% w/w.
5. Preservative compositions as claimed in claims 1-4, wherein the green tea extract is characterised by a polyphenol content, expressed as catechins, equal to or

greater than 45% w/w and a catechin content, expressed as epicatechin-3-O-gallate, equal to or greater than 15% w/w.

6. Preservative compositions as claimed in claims 1-5, wherein the oak extract
5 ranges between 1 and 1000 mg/kg, preferably between 10 and 200 mg/kg, and even more preferably amounts to 50 mg/kg.

7. Preservative compositions as claimed in claims 1-6, wherein the grape seed
extract ranges between 1 and 1000 mg/kg, preferably between 10 and 200 mg/kg, and
10 even more preferably amounts to 50 mg/kg.

8. Preservative compositions as claimed in claims 1-7, wherein the green tea
extract ranges between 1 and 1000 mg/kg, preferably between 10 and 200 mg/kg, and
even more preferably amounts to 50 mg/kg.

15 9. Preservative compositions as claimed in claims 1-8, also comprising an acceptable excipient and/or carrier.

10. Use of preservative compositions comprising at least two extracts selected from:
20 - oak extract obtained from bark,
- grape seed extract,
- green tea extract,

for the preservation of foods liable to lipid peroxidation, provided that when the at least two extracts are grape seed extract and green tea extract the compositions also comprise oak extract.

5 11. Use according to claim 10, wherein the compositions comprise oak extract combined with grape seed extract, or oak extract combined with green tea extract, or grape seed extract combined with green tea and oak extract.

12. Use according to claim 10 or 11, wherein the foods are meat-based.

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13. Use according to in claim 10 or 11, wherein the meat-based foods are mincemeat, cured meats such as salami and sausages, ham and tinned meat.

14. Use according to in claim 10 or 11, wherein the foods are sweet and savoury

15 baked goods and preserves.